



Greening the Meeting

Scientific travel pours huge amounts of greenhouse gases into the atmosphere. Some societies are changing the way they run their annual meetings—and a few scientists are proposing even more drastic changes

EVERY DECEMBER, GEOSCIENTISTS DESCEND on San Francisco for the Fall Meeting of the American Geophysical Union (AGU). In 2002, the 9500 participants traveled an average of 7971 kilometers to get there and back. That means their share of the carbon dioxide emitted by the planes they flew on totals about 11,000 metric tons—roughly the same as 2250 Honda Civics during a year's worth of normal driving.

Flying is a carbon-intensive activity. Scientists may not rack up as many frequent-flier miles as international business travelers, but one thing every field has in common is the big annual meeting and numerous smaller workshops and conferences. Add up the CO₂ emitted in traveling to all those gatherings, and it amounts to a sizable contribution to global warming. Scientists have been instrumental in raising public consciousness about air travel and CO₂ emissions. Now they are beginning to examine the consequences of their own jetting around the globe.

Several scientific organizations are trying to reduce the carbon footprint of their gatherings. The approaches include tinkering, such as reducing the use of plastic cups and reusing

tote bags, and offering attendees the chance to pay to compensate for the carbon emissions their travel generates. More radical ideas include shrinking or eliminating some meetings. A few virtual meetings have taken off, but they sacrifice networking and brainstorming. Until there's a quick, convenient, and carbon-neutral way to travel, self-restraint may be the solution, says David Reay, a climate scientist at the University of Edinburgh, U.K.

A growing problem

Scientific conferences are a booming business. Conference Service Mandl, a scientific conference service provider, lists nearly 4000 upcoming events over the next 2 years or so in its online directory. They range from tiny, highly focused Gordon Research Conferences (GRC) to the 800-pound gorilla of the conference world: the annual meeting of the Society for Neuroscience. (AAAS, publisher of *Science*, runs an annual general scientific meeting that drew 8000 attendees in 2007.)

Conferences are also growing in size. Since 1971, Neuroscience attendance has burgeoned from less than 1500 to a 2005 peak of nearly 35,000—a small city's worth of

researchers, flying in from all over the planet. AGU's Fall Meeting has added 6000 participants over the past 5 years, an increase of more than 60%. And since 1995, the number of Gordon conferences in the United States and overseas has jumped from 130 to 180, with a surge in combined attendance of 40%. In short, even as the globe warms, more scientists than ever are on the move.

The Ecological Society of America (ESA) has taken a hard look at the environmental impact of its annual meeting. In response, it slimmed down the program book, began using soy-based inks, and now distributes its advertiser kit only electronically. The society also arranges with hotels to change linen less frequently and has removed Styrofoam from the meeting entirely. Some of the changes make more of a difference than others, but "every little bit helps," says Michelle Horton, a meeting organizer at ESA.

Other organizations are moving in similar directions, albeit more slowly. AGU paid little attention to the environmental impact of its meeting until recently, according to a spokesperson, but at its next meeting in December the organizers intend to try

Offsets: Worth the Price of Emission?

With society's environmental conscience outpacing its willingness to cut down on carbon-intensive travel, carbon offsetting is coming to the fore as a way for concerned citizens and organizations to reduce their contributions to global warming. The most popular approaches are planting trees to sequester carbon from the atmosphere or paying energy companies to pump renewable energy onto the grid. A new crop of companies has sprung up to cater to the need.

It's a simple idea that's fraught with problems. For instance, the Society for Conservation Biology (SCB) offsets members' emissions from travel to the annual meeting by hiring locals to replant goat-decimated World Heritage Area habitat in South Africa's Baviaanskloof (Baboon Valley). According to offset committee chair Paul Beier, the project provides real, verifiable carbon reductions. However, trees die, so organizations that use offset schemes like SCB's must commit to maintaining their investment and replanting in case of fire or disease. Offsets based on renewable energy technology only work if every dollar spent on an offset actually translates into an increase in the number of green kilowatts a provider pumps onto the grid—tricky to verify if the offset provider is half a world away.

Issues like these have led governments and nongovernmental organizations around the world to introduce offset-certification schemes to give consumers confidence that their money won't be wasted. Technical matters aside, however, some, like British environmentalist George Monbiot, argue that the very concept of offsets—allowing people to feel better about causing carbon emissions—saps the will to conserve or consume less.

—B.L.

organizers say. At this year's conference, held in August in San Jose, California, greater awareness pushed that number up to 500—a huge increase but still less than 15% of the meeting's 3600 registrants. Members of SCB seem to feel more strongly; in the program's debut in July, 97% of the 1600 attendees at the meeting held in Port Elizabeth, South Africa, checked the offset box on their registration form.

Make the meeting count

Another option would be to hold annual meetings less frequently. But that can be a tough sell. When SCB's Board of Governors voted on this idea in South Africa, some members considered the meeting's exchange of ideas too important to forgo. "We tied eight to eight," says Paul Beier, a conservation biologist at Northern Arizona University in Flagstaff and chair of the SCB carbon-offset committee. So the issue was tabled until the next meeting. In any case, Beier thinks his society should restrict meetings to major cities because holding them in scenic outlying areas such as Port Elizabeth means more connect-

ing flights and more emissions. "Nearly everyone flew through Johannesburg," he says, so "in the future, we should hold any meeting in southern Africa in Jo'burg."

The importance of location is also evident from the unpublished analysis of the 2002 AGU and ESA meetings by David Scott and Lawrence Plug, both of Dalhousie University in Halifax, Canada. They found that ESA could have reduced its meeting's emissions more than 13% by changing the venue from Tucson, Arizona, to the more central spot of Omaha, Nebraska.

Edward Hall, a geographer at the University of Dundee, U.K., suggests a more radical

approach: Limit attendance, especially by international travelers. Earlier this year, Hall published a breakdown of the environmental impact of the 2006 annual meeting of the Royal Geographical Society in *Area*, the society's journal. He found that more than 95% of the 810 metric tons of carbon emitted during 4 million kilometers

of conference travel resulted from foreign attendees flying into the U.K.

TRAVEL TIPS

1. Skip meetings when you can.
2. When you can't, combine trips to get the most out of your air miles.
3. Avoid conferences in far-flung lands.
4. For conferences close to home, carpool or take a train.
5. Choose a hotel close to the conference to avoid commuting.
6. Ask conference organizers to team with local hotels to reduce linen changes and other waste for conference attendees.
7. Avoid using disposables such as plastic tableware and Styrofoam cups.
8. Don't collect brochures that will only get thrown out.



webcasting some conference sessions to make it easier for people to tune in from home, as well as asking shuttle-bus drivers to turn off their engines while waiting to load.

These measures only address the conference itself, of course, rather than the larger impact of people traveling to it. According to the Society for Conservation Biology (SCB), 95% of the society's entire emissions comes from jet fuel used in getting members to the annual meeting. Everything else—running the executive offices for an entire year, for instance—pales in comparison. So SCB, as well as ESA, has begun offering carbon offsets to its members to compensate for the emissions related to their air travel. Check a box on either organization's meeting registration form, and they'll tack a maximum of \$20 on to the admission fee, putting it toward projects that help offset carbon. However, offsetting is still new, and some environmentalists think the practice is so plagued by flaws that it is little more than feel-good greenwashing (see sidebar).

Even within ESA, the idea has been slow to catch on. Last year, only six ESA members ponied up extra cash to offset their trip, meeting

That idea might have trouble getting off the ground. Case in point is a small conference concerning, ironically, greenhouse gases. The organizers of the conference—the groups Chemical Research Applied to World Needs and the International Conference on Carbon Dioxide Utilization (ICCDU)—had some discretionary funds at their disposal, and several of the 151 delegates suggested carbon offsets for travel to the conference in Ontario. Instead, the organizers decided to offer travel scholarships to delegates from developing countries, which will be less equipped to cope with warming. “We felt it was very important for them to attend,” says Philip Jessop, an ICCDU member and chemist at Queen’s University in Kingston, Canada.

Virtually there

Researchers don’t necessarily have to attend a meeting in person to get something out of it. Virtual conferences are a growing trend; they have recently been held on topics including nanoscale structures, animal diseases, amphibian conservation, and climate change.

One of the largest such events is the Virtual Conference on Genomics and Bioinformatics (VCGB). In 2001, a Peruvian geneticist named Willy Valdivia-Granda, then associated with North Dakota State University in Fargo, founded the conference to enable

researchers from poorer nations to attend scientific conferences in developed countries. The most recent conference, held in 2005, included 3000 people in more than 50 countries. Valdivia-Granda, now of Orion Integrated Biosciences in New York, recalls a particularly jam-packed venue in India. “They had so many people participating that they had to show the conference in city hall,” he says.

Attendees to VCGB gather at local nodes linked together using Access Grid, a virtual collaboration system developed at Argonne National Laboratory in Illinois. A simple node typically consists of a laptop with a webcam, says project lead Thomas Uram of Argonne, but a top-of-the-line installation might feature a dedicated conference room sporting several computers linked to large flat-panel displays with motorized

webcams, microphones, and sophisticated echo-cancellation equipment. All that can cost as much as \$20,000—much more than the cost of getting to a conference.

The system creates a permanent virtual meeting space on the Internet, which can house collaborators’ data and files, that allows participants to talk things over via video, audio, and chat. Although the original purpose was to facilitate collaboration between small groups of researchers, Access Grid also works for an international multicenter on the scale of VCGB.

In addition to broadening its audience, VCGB has had an environmental payoff. According to an analysis by climate scientist Reay, the 2001 conference prevented the release of 900 metric tons of CO₂. The savings have increased with subsequent years’ growing attendance.

Lower tech virtual formats avoid some of the costs and technical savvy required to set up a conference using Access Grid,

but they have the same basic shortcomings: They lack impromptu conversations and networking between sessions. “I’m nervous of virtual conferences,” says plant biologist Gregory Copenhagen of the University of North Carolina, Chapel Hill. Although he has never participated in a conference like VCGB, he says he worries that “you lose that sense of catching someone in a hallway” and sitting down for a chat.

Reay agrees. “I can’t see a future where we don’t have conferences,” he says. “A lot of the best scientific ideas I’ve been privy to have come over a glass of wine at a conference dinner or a bar later on.” The problem is magnified at small, focused meetings like the Gordon conferences, whose main focus is on that kind of direct personal interaction. According to a GRC organizer, linking in an attendee remotely has been tried: It “failed miserably.”

At their best, conferences put minds in close proximity and can foster the kind of environment that leads to new ideas. Sometimes, they just rehash information that is already published or easily accessible online. Researchers concerned with the environmental impact they make should pose a question before they register, says Reay. “Ask yourself, ‘Do I really need to go to this meeting?’”

—BENJAMIN LESTER



Poster child. The Society for Neuroscience hosts the largest scientific meeting, but all such gatherings consume copious jet fuel and other resources.



Face to face. Virtual meetings, like this one at the Access Grid site in Arlington, Virginia, save on travel—at the expense of hallway brainstorming.